

A new era for water governance

An analysis on water and climate discourse after the 2018 drought in Sweden

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Submitted September 27, 2023

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Abstract:

Access to water is taken for granted in water-abundant countries like Sweden, but safe water supply is increasingly threatened by droughts. This thesis analyses how the Swedish water sector responded to the unprecedented drought in 2018, by analysing water security discourse through the framework "What's the problem represented to be?". It explores implications of the drought on water policy and how actors in southern Sweden work with drought and water shortages. The study found that the drought led to a change in discourse, particularly that water availability cannot longer be taken for granted, and led to inclusion of drought policies in regional water governance. Climate change is increasingly seen as a threat to safe water supply in Sweden, and the sector needs better planning and division of responsibility to ensure water security. The thesis also discusses measures for a more sustainable water governance, including climate adaptation and reducing water use.

Abstract [Sv]:

Tillgång till vatten tas ofta för givet i vattenrika länder som Sverige, men säker vattenförsörjning hotas alltmer av torka. Denna uppsats analyserar hur den svenska vattensektorn reagerade på torkan 2018, genom att analysera vatten-diskurs med hjälp av ramverket "Vad är problemet representerat att vara?". Uppsatsen utforskar torkans effekter på vattenpolicy och hur aktörer i södra Sverige arbetar med torka och vattenbrist. Studien kom fram till att torkan ledde till en diskursförändring, specifikt att tillgången på vatten inte längre kan tas för given, och till att torka och vattenbrist har inkluderats i den regionala vattenförvaltningen. Klimatförändringarna ses alltmer som ett hot mot säker vattenförsörjning i Sverige och vattensektorn behöver bättre planering och tydligare ansvarsfördelning för att säkerställa Sveriges vattensäkerhet. Uppsatsen diskuterar också åtgärder för en mer hållbar vattenförvaltning, bland annat inom klimatanpassning och minskad vattenanvändning.

Keywords: water governance, drought, Sweden, political ecology, discourse, sustainability science

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Finally, I want to thank me for making this thesis happen, and for following my deep interest for water and pursuing a new topic with little prior knowledge. My hope is that this thesis will inspire others to also value water, both within and outside of Sweden. Happy reading!

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Abbreviations

HaV: Swedish Agency for Marine and Water Management

IPCC: The Intergovernmental Panel on Climate Change

IVA: Royal Swedish Academy of Engineering Sciences

MSB: Swedish Civil Contingencies Agency

SDG: Sustainable Development Goals

SGU: Geological Survey of Sweden

SMHI: Swedish Meteorological and Hydrological Institute

1. Introduction

Access to sufficient and safe drinking water is a human right, yet half of the world's population face water scarcity yearly (IPCC, 2023; UN-Water, n.d.). Sustainable Development Goal (SDG) 6, "Access to safe and affordable drinking water for all", is far from being reached until 2030. The decade between 2018–2028 was declared by the United Nations as an International Decade for Action on water issues. While commitments have been made, the pressing issues that remain are how progress on SDG 6 can be accelerated, and how water can be elevated on the global political agenda (United Nations, 2023). Access to water is highly uneven across the world and countries with an abundance of freshwater, such as the Scandinavian countries, have long been able to take water for granted (Sweden Water Research, n.d.). However, the last years extreme weather in Europe has shown that even water rich countries may face increasingly severe droughts exacerbated by climate change (Ahopelto et al., 2019; Kronnäs et al., 2023; Teutschbein et al., 2023). The IPCC have high confidence that effects of climate change on the global water cycle have local consequences on physical water availability¹ and water security² around the world (IPCC, 2023). Freshwater bodies are threatened by changes in precipitation and temperature, and extreme weather events, which poses challenges to the management and supply of drinking water as well as water for industries and agriculture (Allan et al., 2020; Boholm & Prutzer, 2017; Caretta, M.A et al., 2022; Pahl-Wostl, 2015).

In Sweden, a country known for its high-quality drinking water and abundance of freshwater (Teutschbein et al., 2023), droughts have been rare. Water policy and research has predominantly targeted water quality issues rather than quantity and availability (Havs och Vattenmyndigheten, 2022; Sydvatten, 2019). Water quantity concerns were first raised by the Swedish water sector after three consecutive summers with droughts in 2016, 2017 and 2018. In 2016 and 2017, lack of precipitation caused low water levels and local water restrictions were issued in mainly southern Sweden (Livsmedelsverket, 2017; SMHI, 2022). Water levels had returned to normal at the end of 2017, but due to an abnormally dry and hot spring in 2018, Sweden suffered extreme wildfires and water shortages during the summer (Teutschbein

¹ Physical water availability, according to the IPCC, "includes balance of water available from various sources including ground water, water quality and demand for water". (IPCC, 2023)

² The UN-Water definition of water security is "the capacity of a population to safeguard sustainable access to adequate quantities of and acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability". It compasses dimensions of drinking water for human health, ecosystems, economic development and resilience to climate change hazards. (IISD, 2013; UN-Water, 2013)

et al., 2023). The effects of the 2018 drought were unprecedented and led to large losses for forestry and agriculture, including emergency livestock slaughter, irrigation bans and other water use restrictions in central and southern Sweden. This became a wake-up call for the Swedish water sector that Sweden could no longer take access to water for granted (Miljödepartementet, 2022; WSP, 2020).

The effects of climate change on droughts, water availability and security in Sweden have not been prioritised in politics or research until the 2018 drought. However, these risks have not been unknown in research, Boholm and Prutzer (2017) studied risk assessment of drinking water and climate change before the drought and emphasised two major obstacles for developing climate adaptation, the “lack of political saliency of drinking water as a public service” and “the geographical, organizational and institutional boundaries (...) between the plethora of public actors with partly overlapping and sometimes unclear responsibilities for the provisioning of safe drinking water” (Boholm & Prutzer, 2017, p.133). Since the described “wake-up call” in 2018 however, the Swedish water sector has started to discuss, review, and analyse how to create a more sustainable long-term water management, to account for current threats and future risks posed by climate change (Boverket, 2018; Havs och Vattenmyndigheten, 2018, 2022; IVA, 2021; Sydvatten, 2019; WSP, 2020). This is particularly relevant for southern Sweden, which is expected to face high risk of water shortages as low water flows and dry periods are expected to be more common in the future (IVA, 2021). To ensure Sweden’s water security in a changing climate, increasing the understanding of water availability and how to adapt to droughts is essential. To do this, we first must understand how a severe drought like the one in 2018 impacted the Swedish water discourse and governance, which is investigated in this thesis. The ambition with the discourse analysis is therefore that the thesis can lead to a discussion on what is needed for a more sustainable water governance in Sweden.

For the purpose of clarity, I use Stockholm International Water Institute’s definition of water governance to distinguish the difference between governance and management, as I use both concepts in this thesis. “Water governance refers to the political, social, economic, and administrative systems that influence the use and management of water” (SIWI, n.d.). Governance and management are two important but similar concepts in water studies and are sometimes used interchangeably which can cause confusion. Generally, management has traditionally been used for water, but researchers have started to argue for the use of governance as it encompasses more dimensions of water than merely technical (Swyngedouw, 2009). I use management when referring to day to day management of water, and governance when referring to policy, regulations, and administration. In other words, management of water, and governance of the system of water.

1.1 Aim and Research Questions

The aim of this thesis is to understand how the Swedish water sector responded to the unprecedented drought in Sweden in 2018, by analysing water security discourse through the policy analysis framework “What’s the problem represented to be?” (WPR approach). The thesis explores implications of the drought on water governance, specifically if the drought has led to any changes in how actors view and work with drought and water shortages in relation to climate change. It has a national perspective as it analyses national discourse but uses southern Sweden and the region of Skåne as a case due to the particular risk of drought and water shortage in this region. The analysis is limited to drinking water but takes into account the complexity of water and that drinking water cannot fully be separated from other needs and usages of water. The thesis also discusses what is needed for a more sustainable water governance in Sweden in a section on future needs.

The research questions are the following:

- What impacts did the 2018 drought have on the Swedish discourse on water security and on how drought and climate change are problematised by the Swedish water sector?
- How has the 2018 drought impacted Swedish water policy and how the water sector work with water security?

1.2 Contribution to Sustainability Science

Water security is imperative for a sustainable development (United Nations, 2023). In my thesis, I use a sustainability science approach by viewing water governance in Sweden as a complex challenge. Water is a key part of socio-ecological systems and is both affected by and affect society and politics (Linton & Budds, 2014; Ostrom, 2015; Swyngedouw, 2009). Freshwater is also a finite resource, with a limit on how much can be extracted and used (Rockström et al., 2009), which makes water use and protection a sustainability concern locally and globally. The thesis also connects and contributes to sustainability science by considering different temporal and spatial scales of analysis, by on the one hand analysing effects on discourse and policy after an extreme weather event and on the other hand considering national policies and regional management. The WPR approach used in the thesis also links to sustainability science research by being an alternative and more critical way of analysing policy (Bacchi, 2009). My thesis also contributes to the field by analysing a topic with little previous academic attention. Water literature in

Sweden focus mainly on water quality and recently also on flooding, but much less on water quantity, availability, and drought. My aim is also to provide insights into the need to value water and create sustainable water policies even in water abundant countries, mainly because of our increasing understanding of climate change impacts on the global water cycle (Caretta et al., 2022).

2. Background

2.1 Geographical context

Sweden is one of the most water rich countries in Europe, with an inland water system covering 9% of the country's total area (Miljödepartementet, 2022). The national availability of surface water and groundwater is plenty, but access varies locally (Havs och Vattenmyndigheten, 2022). In southern Sweden, and in particular the most southern region of Skåne, which is used as a case in this study, surface water is found in many but small rivers and lakes. Water management in the region is unique in how the water bodies are affected by agriculture, and drinking water as a resource is more difficult to access than in other parts of the country (Länsstyrelsen Skåne, n.d.-b). Southern Sweden is also at higher risk for temporary groundwater shortage (Havs och Vattenmyndigheten, 2022). Skåne is the region with the largest area of agricultural land in Sweden, which covers 45% of the total land area, and the second largest region in area of settlement (SCB, 2023b). The population was 1,4 million in 2022, making it the third largest region in population size (SCB, 2023a). The region does not have sufficient water supply for the large population and depends on water from lake Bolmen in the region of Småland which is transported via a tunnel built in the 1980s.

2.2 Projected effects of climate change on Swedish water

In preparation for COP 27 in 2022, a report on Sweden's adaptation to climate change highlighted water supply shortage as one of seven important areas of adaptation work (Miljödepartementet, 2022). Climate change is considered to already impact Swedish surface and groundwater, and the security of drinking water supply, due to changed weather patterns and an increase in droughts and flooding, which affects both quality and quantity (Boholm & Prutzer, 2017; Miljödepartementet, 2022). The Agency for Marine and Water Management (Havs och Vattenmyndigheten, 2022) deems the biggest threat to be increased variability in precipitation with higher frequency of floods. Other predicted changes are temperature

increase, leading to increased evapotranspiration and longer growing seasons, as well as milder winters leading to shorter periods of groundwater formation, changes in snow cover in northern Sweden and weakened spring floods. This can also lead to increased need for irrigation and general water consumption, which threaten water availability in mainly southern Sweden where water shortages and low water flows already occur (Havs och Vattenmyndigheten, 2022; Miljödepartementet, 2022). A Swedish study by Grusson et al. (2021) found that despite a future increase in precipitation, Sweden is still likely to face depleted soil water reserves due to increased temperatures and evapotranspiration. Increased precipitation is also likely to come in intense precipitation events which would produce more runoff than soil infiltration (Grusson et al., 2021). Sweden might therefore experience increasing water shortages even if it rains more in the future.

Southern Sweden is the region with the highest risk of water shortages as low water flows and dry periods are expected to become more common (Havs och Vattenmyndigheten, 2022; Teutschbein et al., 2023). Groundwater levels are also expected to decrease in the area (Miljödepartementet, 2022), but Barthel et al., (2021) notes that lack of research on climate change impacts on groundwater recharge in Sweden makes it difficult to predict future availability. Water stress during summers is expected to be aggravated by irrigation and societal pressures such as growing cities, population, and tourism (IVA, 2021; SMHI, 2022; Teutschbein et al., 2023). This “further increases the need for developing local and regional adaptation plans” (Teutschbein et al., 2023, p.1263).

2.3 The Swedish water sector

Swedish water issues are handled by several national ministries and agencies, as well as regional and local actors. One of the main problems with the current water governance, considered by the actors themselves, is that no actor has the overarching responsibility (Havs och Vattenmyndigheten, 2022; IVA, 2021). To get a better overview of the fragmented water sector, I will here provide an overview of the most relevant actors, as they are of interest for the analysis.

Spatial scale	Actor	Main responsibility
National level	HaV	– <i>Environmental goals related to surface water</i>
	MSB	– <i>Extreme weather and implementation of the EU floods directive</i>
	Boverket	– <i>Physical planning of land and water</i>
	Swedish Food Agency	– <i>Drinking water issues</i>
	SMHI	– <i>Climate and hydrology research</i>
	SGU	– <i>Groundwater research</i>
Regional level	Water authorities (5)	– <i>EU Water Framework Directive and regional management plans</i>
	County administrative boards (21)	– <i>Supervisory authority over all water activities and referral body for water permits</i>
	Environmental courts (5)	– <i>Cases regarding the Environmental Code and the Planning and Building Act</i>
Local level	Municipalities (290)	– <i>Providing water and sewage services</i>
	VA-Organisations	– <i>Providing water and sewage services</i>
	Water councils	– <i>Research and protection of water basins</i>

Table 1. Levels, actors and main responsibility in the Swedish water sector, with inspiration from HaV's "Actors for sustainable water resource management" (Havs och Vattenmyndigheten, 2022). Responsibilities are gathered from HaV (2022), Sydsvatten (2019) and Vattenmyndigheterna (n.d.). Note that this is a selection of actors with relevance to this thesis, see HaV's report for a more comprehensive list.

Governance
Management
Research

On the national level, issues of drinking water and environmental protection are handled by up to nine governmental ministries and 30 expert agencies (IVA, 2021). The main agencies are the Swedish Agency for Marine and Water Management (HaV), Swedish Food Agency (Livsmedelsverket), Boverket and MSB (Havs och Vattenmyndigheten, 2022; Sydsvatten, 2019). Other actors involved in water research and policy are, among others, universities, the Royal Swedish Academy of Engineering Sciences (IVA) and Svenskt vatten (Swedish Water).

At the regional level, water governance is divided between 21 County Administrative Boards, five Water Authorities and Environmental Courts. The Boards are the supervisory authority over all water activities in the county and the referral body for water permits. They also have a guiding role for municipal planning and to establish water protection areas (Havs och Vattenmyndigheten, 2022; Sydsvatten, 2019). Since 2018 they have also been mandated to produce regional water supply plans, that function as a direction for protection of water resources and planning for climate adaptation. Five of these Boards are also Water Authorities in respective water district, which comes with the responsibility to implement the

EU Water Framework Directive and create management plans for the district with guidance from HaV and SGU (Vattenmyndigheterna, n.d.).

The local level consists mainly of the municipalities who have the main responsibility of providing water and sewage services (called VA), including drinking water, wastewater and storm water (Boholm & Prutzer, 2017; Sydvaatten, 2019). Some municipalities put the responsibility on VA-organisations, one example being Sydvaatten which is a municipally owned company responsible for water supply to several municipalities in Skåne (Sydvaatten, n.d.). While it is the role of the state to support the municipalities in the operative work, it is the municipalities themselves that are responsible for prioritizing climate investments and decisions based on local need (Havs och Vattenmyndigheten, 2018). There are also local water councils that work with research and protection of specific water basins.

2.4 Water use in Sweden

Sweden withdraws around 1% of the water supply, which is low in comparison to other European countries. Spain for example withdraws over 20%, which is an indication of water shortage. Sweden has decreased its water usage since the 1990s, mainly because of investments in water effective technology (Havs och Vattenmyndigheten, 2022). Of all freshwater supply, 80% comes from surface water and 14% from groundwater aquifers (Figure 1). For drinking water supply specifically, half comes from surface waters, while the other half from groundwater, either from natural aquifers or artificial wells (Barthel et al., 2021; Boholm & Prutzer, 2017; Sydvaatten, 2019). The biggest freshwater users in Sweden are the industries (61% in 2015), households (23%) and agriculture (13%; Sydvaatten, 2019). This differs greatly from global statistics, where agriculture stands for over 70% of all freshwater use (The World Bank, 2022).

For households, only those connected to municipal water are considered. Around 1 million people, 10% of the population, have private water supply from wells or other sources to which the municipality is not responsible for providing water (Boverket, 2018). These are likely to be extra vulnerable to changes in water supply and therefore to droughts, found by Swedish and Finnish studies on the 2018 drought (Ahopelto et al., 2019; Teutschbein et al., 2023). Hydropower, which stands for 41% of Sweden's electricity (Energimyndigheten, 2023), is not considered as a water user but is dependent on sufficient quantities of water. Large power plants can also impact the yearly water cycle, as they alter the natural water flow in rivers (Havs och Vattenmyndigheten, 2022).

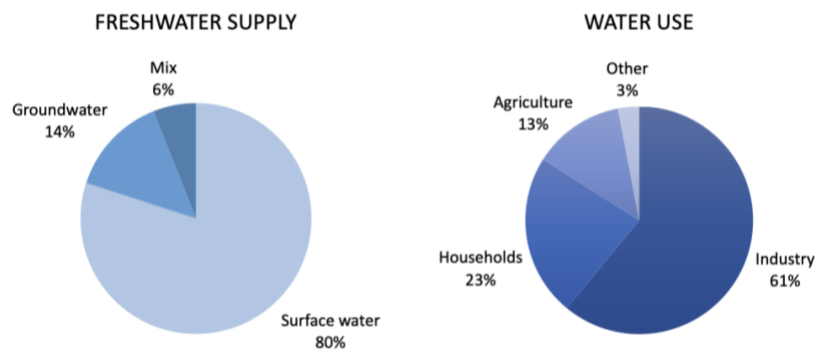


Figure 1. Overview of freshwater supply and use. The latest available data is from 2015 (Sydvatten, 2019).

Apart from societal uses of water, another 20% of all withdrawn water is lost in the public water network (Havs och Vattenmyndigheten, 2022). This reflects the large infrastructure debt within the water and sewage sector (called VA sector), as the infrastructure is between 40–50 years old and needs heavy investments to be improved and renewed (IVA, 2021). Incentives for infrastructure improvements and good water management in general are lacking due to the very low, or no, cost of water (IVA, 2021). Boverket (2018) estimates that today’s drinking water sources are not sufficient to cover future water needs, and argues that more areas need to be set aside for drinking water to ensure a safe long-term supply. Additionally, lack of reserve water is considered by most of the County Administrative Boards as a main threat to water supply (vattenförsörjning), and around half of the boards also consider shortage in the normal daily supply as a threat (Boverket, 2018).

3. Theory

3.1 Discourse and the WPR approach

This thesis studies ‘discourse’, a broad and widely used concept necessary to define (Bacchi, 2009). After reviewing the works on discourse analysis and critical discourse analysis by scholars such as Fairclough (2010) and Gee (2005) at the early stages of the research process, I found that I could best make sense of my research questions, data collection and analysis with the discourse lens offered by Bacchi in the “What’s the problem represented to be?” (WPR) approach. In the WPR approach, discourses refer to forms of knowledges, and differ from critical forms of discourse analysis which understand discourses as language or language use (Bacchi, 2009). Discourses “are socially produced forms of knowledge that set limits upon what is possible to think, write or speak about” (Bacchi, 2009, p.35), meaning that the focus is

on the deep-seated ways of thinking that influence and shape politics. Bacchi's WPR approach and its view on discourse build on a "Foucault-influenced poststructural perspective" (Bacchi & Goodwin, 2016, p.4). Foucault differed from the common linguistic focus in discourse analysis, mentioned above, and was instead interested in discursive formations, truth claims (knowledges) and their role in governing (Bacchi, 2009; Bacchi & Goodwin, 2016). Analysing language and the impacts of power structures, such as in Gee (2005), is not relevant to the research questions and therefore outside the scope of my thesis. Instead, I use the WPR approach to understand how discourse, or knowledges, are shaped and their effects.

The WPR approach is not a discourse analysis, but rather a poststructural, and critical approach to policy analysis of discourses (or knowledges) (Bacchi, 2005). While conventional policy approaches analyse how policies deal with outside-existing problems, WPR instead argues that governance actors are actively creating or producing problems within the process of creating policy (Bacchi, 2009). The idea is that "what we propose to do about something indicates what we think needs to change and hence what we think the "problem" is" (Bacchi & Goodwin, 2016, p.16). It claims that "policies are always created to address a certain "problem", but that this problem is seldom defined explicitly" (Hajdu & Fischer, 2017, p.541). It is therefore important to make this implicit problem explicit and scrutinise it (Bacchi, 2009). It is a critical mode of analysis that questions the common view that policies deal with existing problems, by problematising how the problem put forward in the policy is represented and created. The focus of WPR is therefore about how problematisations (i.e., how something is represented as a problem) are central to processes of governing, so that we can understand how governing takes place (Bacchi, 2009). The WPR approach offers a methodology for this analysis, which I apply in my thesis and explain further in the methodology section.

3.2 Political Ecology and the Hydrosocial Cycle

What water is, and means, varies between people and research fields. It is seen as a common good, a commodity, a biophysical system, a cultural symbol, as well as a necessary resource for Earth and human survival (Mangold et al., 2014; Melo Zurita et al., 2015). For this reason, it is necessary to explain my own theoretical stance on water. I view my research topic on water issues through a political ecology lens, which sees water and society as intertwined and argue that the two cannot be studied separately (Laituri, 2020; Linton & Budds, 2014; Swyngedouw, 2009). Political ecology also gives specific focus to scales, both temporal and spatial, which is considered in my thesis. As a result of a growing body of work in political ecology of water, the concept of the 'hydrosocial cycle' developed during the early 2000s (Figure 2). It is

based on, but opposes, the concept of the hydrological cycle that separates water from society, and instead offers a way to analyse water-society relations (Linton & Budds, 2014). The hydrological cycle would exist without humans, but society's modification of water with dams, canals and other technology has shaped natural water flows into human benefit and profit, which is the hydrosocial cycle (Rodríguez-Labajos & Martínez-Alier, 2015).

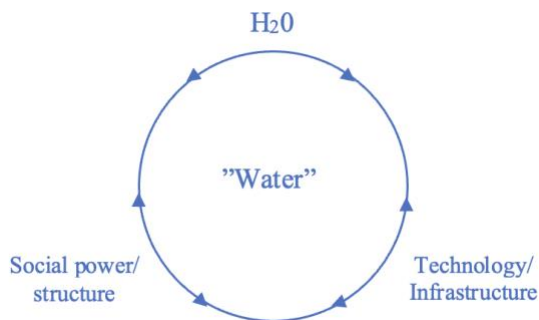


Figure 2. The hydrosocial cycle. Own illustration based on Linton and Budds (2014). "Water" is in quotation marks to indicate that water can have different meanings depending on the analysis and needs to be defined.

One of the first scholars to theorise the concept, Swyngedouw (2009), sees water environments as socio-physical constructions that are actively produced by social and political power. Changes in the hydrological cycle correlate to power, and change is therefore never politically neutral. When sustainability is enhanced in one place, it is undermined in another. "Interventions in the organization of the hydrological cycle are always political in character and therefore contested and contestable" (Swyngedouw, 2009, p.57). Research on water issues has mostly concentrated on technological efficiency and management while neglecting other important factors, such as political and economic (Swyngedouw, 2009). Linton and Budds (2014) however see a discursive shift in the last decade from management to governance, which shows a new awareness of the complexity of the field and its social aspects. The management focus is still dominant in Swedish water research, which pays strong attention to quality concerns. This stems from Swedish society's general focus on quality according to Sydvaatten (2019). The hydrosocial cycle instead makes the social aspects of water possible to analyse, and the politics and governance that affect them (Laituri, 2020; Linton & Budds, 2014). It raises questions about how water is represented, who is entitled to and who controls water, as well as which actors and differing views and discourses of water are involved. Through this, it is possible to analyse how issues such as scarcity and floods are not merely natural phenomenon, but also created through social and political practices (Linton & Budds, 2014; Swyngedouw, 2009). "The ways in which water flows over space and time is also shaped

by human institutions, practices and discourses that determine modes of control, management and decision-making” (Linton & Budds, 2014, p.173).

Political ecology and the hydrosocial cycle are, like the WPR approach, critical in how it thinks about water problematisations. While I do not make a hydrosocial analysis in this thesis, I do use this lens to analyse my data and discuss my findings. This particularly links to my contribution to sustainability science addressed above.

4. Methodology

4.1 Research design and framework

The ontological position in this thesis is constructivism, meaning that reality is viewed as socially constructed (Bryman, 2016). This approach is particularly relevant for political ecology studies on water issues, as these are inherently political. Swyngedouw (2009) argues that environments in the hydrosocial cycle are socially constructed, since the hydrological cycle is altered as to meet the needs of society and to be economically profitable. The research design I deemed best suited for this study is a qualitative analysis that gives the opportunity to gain a deep understanding of a topic (Bryman, 2016). I used a mixed methods approach (Silverman, 2017) by combining two qualitative methods for data collection, a text analysis with the WPR approach of written policy proposals and semi-structured interviews on the drought’s effects on policy and management. The reason for this was to gain a deeper insight into how water discourses translate into action.

Since the WPR approach focuses on written texts and on underlying assumptions rather than what people say, interview material is not applicable to the analysis according to Bacchi (2009). In order to find a suitable way to integrate both methods, I took inspiration from Biermann et al. (2022) who studied the political impact of the SDGs based on three levels of discursive, normative and institutional effects. They define discursive effects as “changes in global and national debates” towards an alignment with the SDGs, normative effects as “adjustments in legislative and regulatory frameworks and policies” and institutional effects as “evidence for the creation of new departments, committees, offices or programmes” (Biermann et al., 2022). If all three effects are visible in a political system, it is defined to have a transformative impact, which is a goal of the SDGs.

The WPR analysis in this thesis targets the discursive level and this covers the largest extent of the analysis. The interviews target the normative and institutional levels by considering how the change in discourse has translated into policy and into action. I have redefined the three levels to fit with my research topic to be the following:

- Discursive level: Changes in discourse on water governance in Sweden after the 2018 drought.
- Normative level: Effects of the 2018 drought on Swedish water policy.
- Institutional level: Effects of the 2018 drought on how actors work with water security.

Through the text analysis and the interviews, I also gained information on what the actors believe needs to be done for a sustainable water governance, and since that is a part of my thesis aim, I have added a fourth point on ‘Future’ to the framework. See Table 2 for an overview of the integrated framework.

Table 2. Integrated analytical framework applied from (Bacchi & Goodwin, 2016) and (Biermann et al., 2022).

Level	Definition	Analysis method
Discursive level	Changes in discourse on water governance in Sweden after the 2018 drought.	WPR approach
Normative level	<i>Translation into policy:</i> Effects of the 2018 drought on water policy (regulations and laws), on a national level and in Skåne.	Interviews
Institutional level	<i>Translation into action:</i> Effects of the 2018 drought on how actors work with water security, in Skåne.	Interviews
Addition to framework		
Future	Needed changes in water governance related to water security and drought.	Interviews

4.2 WPR approach

4.2.1 WPR framework

The framework ‘What’s the problem represented to be?’ by Carol Bacchi (2009) was applied in this thesis as a way to understand discourse in selected policy proposals. Bacchi (2009) lists six questions to guide the researcher in analysing policy through the WPR framework. The aim of the approach is to critically question

policy to find problematisations, highlight deep-seated assumptions and uncover silenced discourses. The questions, as updated from the original framework, are (Bacchi & Goodwin, 2016, p.20):

1. What's the problem [...] represented to be in a specific policy or policies?
2. What deep-seated presuppositions or assumptions underlie this representation of the "problem" (*problem representation*)?
3. How has this representation of the "problem" come about?
4. What is left unproblematic in this problem representation? Where are the silences? Can the "problem" be conceptualized differently?
5. What effects (discursive, subjectification, lived) are produced by this representation of the "problem"?
6. How and where has this representation of the "problem" been produced, disseminated and defended? How has it been and/or how can it be questioned, disrupted and replaced?

Bacchi (2009) argues that the framework can be used without applying all questions and that "it is possible to draw selectively upon the forms of questioning" (Bacchi & Goodwin, 2016, p.24), as long as self-problematising and reflexivity are considered in the analysis. Examples of this can be found in several WPR studies (Bergman et al., 2020; De Kock, 2020; Komai, 2023).

Since my aim with the text analysis is to specifically analyse what problem the policies address and how climate change and the 2018 drought are part of the discourse, the selected documents are analysed with Q1, Q2 and Q4. These target problematisation and problem representation in the policy proposals, and what is left unproblematic or silenced. Bacchi elaborates on the goal with each question and how to go about the analysis, which I present briefly here.

The goal with Q1 is to identify a problem representation through investigating what the main "problem" is (Bacchi & Goodwin, 2016). In other terms, "if a government proposes to do something, what is it hoping to change? And, hence, what does it produce as the "problem"?" (Bacchi, 2009, p.x). Bacchi gives the example of if training is given to women in a policy targeted to increase their representation in higher paid occupations, the "problem" is then represented to be women's lack of training (Bacchi, 2009).

For Q2, the goal is to understand how this problem representation has been made possible, by looking at assumptions, and discourses needed for it to be comprehensible. It is the main WPR question for analysing discourses, with the aim to "understand how governing takes place through *knowledges* [discourses]" (Bacchi, 2018). Bacchi (2009) notes that it is not assumptions held by policy makers that are of interest here, but rather assumptions that lodge within problem representations. This means the forms

of knowledge, such as cultural values, needed for a problem to be thought about in the way identified in Q1 (Bacchi, 2009).

Finally, Q4 focuses on raising and critically examining alternatives to the problem representation, to see unproblematized elements in it and if other problems have been silenced (Bacchi & Goodwin, 2016). In this analysis, I use a Political Ecology lens to critically look for silences with a focus on justice and the social dimension of the hydrosocial cycle. These elements were found through a literature review on water issues globally and in Sweden, and through noting themes only briefly mentioned or brushed over in the prescriptive texts.

I chose to exclude Q3 and Q6 as they would require an extensive historical analysis and do not contribute to the research questions. Q5 was originally intended to be included, but it is constructed by Bacchi (2009) to focus on groups of people affected by a policy proposal. The chosen reports on Swedish water governance do not relate directly to one group of people, which is more common in social policies (Bacchi, 2009), and I therefore did not find this question applicable to this thesis.

4.2.2 Data selection

When conducting a literature review of the topic in the start of the research process, I found seven policy reports published between 2017–2022 on water governance and drought, and two reports on climate adaptation where water was discussed. These were found from Google searches on “Swedish water management” and similar phrases in both Swedish and English, and on the websites of ministries and agencies presented in the background section. Snowball sampling of initial reports led me to others, until the data material was saturated. The actors behind these reports were SMHI, Ministry of the Environment, Swedish Agency for Marine and Water Management (HaV), Royal Swedish Academy of Engineering Sciences (IVA), Sydvatten, Swedish Food Agency, consulting firm WSP, and the National Expert Council for Climate Adaptation.

These reports discuss different ways to improve governance of Swedish water resources, and all refer the drought in 2018 as a reason for why current water governance needs to be improved. Together, the articles provide a roadmap for what the authors, water actors, consider a sustainable water governance should look like. All texts include water issues outside of the scope of this thesis (e.g., water quality) and these parts have been reviewed but left out of the analysis. This early review of grey literature showed that there is a change in discourse regarding Swedish waters and management, which led to an interest in understanding how climate change plays a role in this and what problem the policy proposals

actually attempt to solve. These reports are therefore used as material for a discourse analysis (Table 3). Three of these seven reports were chosen as main “prescriptive texts” due to their extensive scope, which follows the WPR methodological approach inspired by Foucault, who defined them as texts written to offer rules and advice (Bacchi, 2009). Two of the author organisations are actors from the water sector, HaV and Sydsvatten, while the third, IVA, is an external science academy but was deemed relevant as the report’s project group consisted of representatives from multiple water organizations. I perceive these reports as policy proposals due to their proposals for new strategies and agendas towards better, or more sustainable, water governance.

Table 3. Main prescriptive texts used for analysis. The supporting documents are listed in Appendix 1. Report names translated from Swedish by this author.

Author	Year	Report Name	Scope
Swedish Agency for Marine and Water Management (HaV)	2022	A sustainable water resource management – A proposal for a strategy to meet today's and tomorrow's water needs for societal development and ecosystems (Havs och Vattenmyndigheten, 2022)	National level <i>Strategy proposal</i>
Royal Swedish Academy of Engineering Sciences (IVA)	2021	Agenda for sustainable water supply. Report from IVA's project Sustainable water supply – access to clean water in a changing climate (IVA, 2021)	National level <i>Proposal for a new water agenda</i>
Sydsvatten	2019	Climate safe water – how is the water enough for everyone’s needs and who should make sure it is enough? (Sydsvatten, 2019)	National level <i>Challenges and solutions</i>

4.3 Interviews

As the thesis aims to also understand the impact discourse has on water policy and management, I have complemented the WPR analysis with conducting interviews with actors involved in the governance of water supply in southern Sweden. With these interviews, I investigated how the 2018 drought has impacted how the actors view and work with drought and water shortage. I chose to focus on Skåne rather than the national level as the region is disproportionately at risk of drought and water shortage in a changing climate. I strived to have interviewees from different levels and water actors and selected them on the criterion that they work with water governance or management in Skåne directly or that their work is linked to Skåne. I had three interviews and kept the number small due to time constraints and since they are a compliment to the WPR analysis. The interview information is summarised in Table 4 below.

I used a semi-structured interview guide (see Appendix 2) for the interviews and structured my questions based on my integrated framework but had different questions depending on the interviewee's organisation. The County Administrative Board in Skåne wished to include more people in responding to the questions, whereby I sent out my interview guide by email to first receive written answers, and then followed up with an interview with two additional representatives. In total, four people from the organisation have contributed with information used in this thesis. Since the purpose with the interviews was to gain information on their work and understanding of the drought, I did not see a limitation with this. All interviews were recorded and transcribed in Swedish and after coding of themes I translated relevant information and quotes to English. For the coding, I followed my framework structure and collected and summarised the data on normative and institutional level, as well as future measures. I also differentiated between different actors and spatial levels, for example changes in policy on national and local level.

Table 4. Interviewees

Interview	Date	Level	Role/Organisation
1	2023-04-17	Local – Southwest of Skåne	Researcher with connections to local VA-organisations
2	2023-05-26	Regional – Southern Sweden	Water Authority of the South Baltic Sea Water District (Vattenmyndigheten Södra Östersjön)
3	2023-05-29	Regional – Skåne	County Administrative Board Skåne (Länsstyrelsen Skåne)

5 Analysis and discussion

The analysis is structured in four main parts: discursive level, normative level, institutional level, and future needs for a more sustainable water sector, following my framework (Table 2). The discursive level is divided into Q1, Q2 and Q4 from the WPR analysis, and in the following parts I present the interview results. See Table 5 for structure and main themes.

Table 5. Structure of framework and main themes.

Framework level	Discursive	Normative	Institutional	Future
Spatial scale	National	National + Regional	Regional	National + Local
Main themes	<p><i>The 2018 drought has:</i></p> <ul style="list-style-type: none"> - shown that Sweden lacks a unified governance. - shown new needs of governance and planning. - made obvious the effects of climate change on Swedish water supply. <p><i>Underlying assumptions:</i></p> <ol style="list-style-type: none"> 1. Water is taken for granted 2. Water is free 3. Lack of knowledge <p><i>Unproblematised elements:</i></p> <ul style="list-style-type: none"> - Reducing water demand - Justice perspective on water pricing 	<p><i>Since the 2018 drought:</i></p> <ul style="list-style-type: none"> - Increased focus on drought and water shortage in regional plans for southern Sweden. - The County Administrative Board has an expanded mission to protect and monitor water resources and to inform about alternatives to extraction. - Increased focus on drought in EU directives, which impacts the work of the Water Authorities. 	<p><i>Since the 2018 drought:</i></p> <ul style="list-style-type: none"> - More preventive work by local and regional actors in southern Sweden. - More inter-municipal cooperation on securing water supply. - Water shortage issues have been lifted on the municipal agenda. - County Administrative Boards in the district have increased their supervision of water extractions and water protection areas. - Increase in water withdrawal bans. 	<p><i>Proposed changes in national and local governance:</i></p> <ul style="list-style-type: none"> - Need for more collaboration and clarified responsibilities. - Strategic work between municipalities. - See water as one entity within municipalities. <p><i>Proposed changes for climate adaptation:</i></p> <ul style="list-style-type: none"> - Review capacity of treatment plants and emergency reserves - Account for an increased need and competition of water. - Reduce leakage and inefficient use. <p><i>Identified problems:</i></p> <ul style="list-style-type: none"> - Which level should have the overarching responsibility for future water security? - How to reduce water use for households and increase industries' water efficiency.

5.1. Discursive level

This section focuses on changes in discourse on water governance in Sweden after the 2018 drought, through a WPR analysis of selected reports. The questions in the WPR framework can be systematically analysed and presented in order, or be applied in a more integrated analysis, according to Bacchi (2009). An integrated analysis is advised when selecting a few of the questions, as I have done, but I chose to keep the questions separate for clarity since my analysis contain several prescriptive texts and actors.

5.1.1 Q1: *What's the problem represented to be?*

To identify the problem representation in the selected policy proposals, I have, as suggested by Bacchi (2009), worked backwards from proposed solutions to understand what is being problematised. A particular focus is given to if and how climate change and the 2018 drought event are part of the problem representation. How drought is portrayed in the policy proposals shows how water availability is viewed by the actors. I hereafter refer to the prescriptive texts by its author organisation name or acronym, HaV (Havs och Vattenmyndigheten, 2022), IVA (IVA, 2021) and Sydsvatten (Sydsvatten, 2019).

I understand the main proposal of change in all reports to be improving and uniting the governance³ of water issues, so that water is lifted to be a central social and infrastructure issue. All texts also suggest clarified division of responsibility between local and regional water actors, and better collaboration between municipalities within the same water basin. Sydsvatten and IVA highlight the lack of an overall responsible governmental body for all water issues and suggest HaV for this role. Sydsvatten proposes that this main actor should also develop a national water budget (Sydsvatten, 2019). All texts list a variety of proposed measures to ensure water supply and improve governance, measures that range from changes in policy and funding of water to changes in practical management and usage. HaV's recommendations fit in the two categories: actions to reduce the risk of water shortages, including more proactive strategic planning, and actions for strengthened water management. Sydsvatten proposes that water governance needs to be adapted to today's climate and include better planning of future climate variations. The reports target the whole water sector, so it is reasonable that there is a wide spectrum of

³ The Swedish word "*förvaltning*" is used in the texts which directly translates to management or administration. Since this concept include political aspects of decision-making and legislation, I consider the best translation to be governance.

measures in all areas of Swedish water governance. However, this gives the impression of a fragmented sector with many challenges in relation to a changing climate, and I therefore interpret the collective proposed solution to be a general improvement of the organisation and planning of the water sector.

To understand how climate change is represented in the problem representation, and the effect the drought had on Swedish water discourse, I specifically focused on how they are presented in the texts. All three reports focus on water in relation to climate change and future needs, as can be seen from their titles (see Table 3). The drought is pointed out as a key event in all three reports but is given a particular focus by Sydsvatten, who refers to climate change as a current threat while the other reports rather frame it as a future threat (even though Sydsvatten's report is the oldest). Sydsvatten writes that "it has been known for a long time that the climate will change – but only after the drought in the summer of 2018 did it become obvious for the vast majority of people how it can affect society concretely" (Sydsvatten, 2019, p.4), and points out that adaptation should focus on quicker variations in rainfall including both droughts and floods. I interpret this way of linking climate change to Swedish water as a relatively new discourse, as Sydsvatten refers to 2018 as a point in time when the view about how water should be managed changed.

Both Sydsvatten and HaV discuss a link between drought and governance, by saying "what we have experienced in the last decade and especially in 2018 are completely new needs for water governance and above all the need to plan for the use and distribution of the water resource" (Sydsvatten, 2019, p.2), and "the droughts of recent years have shown that Sweden lacks a unified governance of available water resources at both local, regional and national level" (Havs och Vattenmyndigheten, 2022, p.11). This problematisation makes evident that the main problem is not only a lack of good governance in general, as can be interpreted by the wide range of proposed measures, but specifically that the current water governance lacks the planning needed for it to ensure water security. Therefore, I interpret that the problem is represented to be poor planning and division of responsibility in water governance, that has been illuminated by the 2018 drought. This also indicates that the way the sector has been organised has contributed to unpreparedness for droughts as severe as the one in 2018.

5.1.2 Q2: What deep-seated presuppositions or assumptions underlie this representation of the problem?

This question analyses why there is a need to improve the organisation and planning in water governance in the first place and which assumptions about water and climate that have led to the sector being

unprepared for droughts. From the Q1 analysis I found three particular formulations on underlying issues in water governance in Sweden. These are: water is taken for granted, water is free, and there is a lack of knowledge about water sources and use.

The first underlying issue, that water is taken for granted, comes from how water is conceptualised in Sweden, or what meaning is given to water in Bacchi's terms. With a historic and geographical abundance of water in terms of supply and access, water has been taken for granted by society (Sydvatten, 2019; WSP, 2020). Sydvatten argues that while Sweden has a tradition of protecting the quality of water, society is not used to "having to consider water as a limited resource" (2019, p.8). When understood as an unlimited resource, water is not valued and therefore does not have to be managed in a sustainable way (UNESCO World Water Assessment Programme, 2021). Water is not a political issue either, and has in the past rarely come up in media unless there is a crisis such as contaminated drinking water or low water tables demanding bans as in 2018 (SMHI, 2022). The Swedish Food Agency claims that society does not handle freshwater as our most important type of food (livsmedel), especially in terms of water pollution, and the agency sees a difference in how drinking water issues are viewed in other countries (Livsmedelsverket, 2017). They also argue that to increase awareness among water users and politicians, drinking water requires a higher degree of control. Water access being taken for granted can also be an underlying reason for that focus in society, and therefore also research, has been on quality concerns such as overfertilization rather than questions on quantity, irrigation, and drainage (Sydvatten, 2019). Current management is also characterized by quality concerns for the environment and drinking water, and HaV argues that other societal needs on quantity and cultural values receive limited attention (Havs och Vattenmyndigheten, 2022). Sydvatten (2019) argues that an awareness of the value of water would be a driving force for limiting, reusing, and making water use more effective just like other resources.

The second underlying issue, that water is free (IVA, 2021), can also be attributed to that water is undervalued. While users pay a VA-fee to access water and sewage services, water as a resource is not priced which means that there are no economic incentives for protecting water against overextraction (Havs och Vattenmyndigheten, 2022). "Sweden is the only country in the EU that does not have a price for water withdrawals" (Sydvatten, 2019, p.30). IVA also claims that because water is free, "incentives for good water conservation are missing" (IVA, 2021, p.15). This also have effects on the question of who owns and should be responsible for water, and the polluter pays principle cannot be invoked (Livsmedelsverket, 2017).

The third issue of knowledge on water use is addressed by all three reports as a problem that creates difficulties for governance and particularly the planning of climate change effects. They highlight

a lack of knowledge in where and how much water is extracted and in how different water bodies are affected by drought and overextraction. HaV also admits that actors “on all levels have been unprepared for the course of events” (Havs och Vattenmyndigheten, 2018, p.12), linked to the droughts caused by low precipitation in 2016 and 2017. One reason being that drought is considered a small problem and is neglected in favour to other needs in society or businesses (Havs och Vattenmyndigheten, 2022).

5.1.3 Q4: What is left unproblematic in this problem representation?

In this part I critically examine two unproblematized elements or silences in the reports’ problem representation. One proposed solution by the prescriptive text is reduction of water use/demand but it is given considerably less attention than measures related to increasing supply or improving management of water sources. This is odd, given that the demand for water is what often causes water shortage in the first place, called relative water scarcity (Scoones et al., 2019), especially in a country with an abundance of water and precipitation like Sweden. This was also found in research on Swedish municipalities’ perception and management of drought risk after the 2017 and 2018 droughts (Teutschbein et al., 2023). They found that measures to reduce water demand were suggested much less than measures to increase supply, which they argued was contradictory to recent trends in sustainable water resource management (Teutschbein et al., 2023). With the increased risk for droughts in the future and the possibility of an increase in population and water needs (Miljödepartementet, 2022), being able to reduce the demand for water is essential.

Another unproblematized element or silence in the prescriptive texts relates to the cost of water from a justice perspective. The low cost of water, identified as one of the underlying issues in Q2, has caused all three actors to suggest an increased price of water services, the VA-fee. This increase is suggested to finance infrastructure improvements and long-term sustainability measures. Sydsvatten calls it a “climate protection fee” (klimatsäkringsavgift) (Sydsvatten, 2019, p.6). Funding for improving water security is of course necessary, but what fails to be mentioned in the texts is how this funding will impact socioeconomically vulnerable households. The VA-fee is on average low in Sweden, around 1% of income (Havs och Vattenmyndigheten, 2022), but the price each household pay differ greatly depending on the form of housing and location in Sweden (Mangold et al., 2014; Interviewee 1, personal communication, April 17, 2023). As an example, Mangold et al. (2014) studied the introduction of volumetric water billing in rental apartments in a socio-economically vulnerable area in Sweden. They found that while the water use decreased by 30%, the cost of water increased, and residents who received welfare aid became even

more trapped in welfare dependence (Mangold et al., 2014). While this was a small case study and not necessarily a large-scale effect of increased prices on drinking water, it is important to acknowledge and reflect on the effects this proposition could have on people's access to drinking water. A justice perspective on how an increase in the price of water will impact access is important to ensure that households can afford their basic water need. Following political ecology and the idea about a hydrosocial cycle, changes in the water cycle is never neutral and increased sustainability in one place can lead to less in another. The actions to improve sustainable water management can therefore have negative impacts on social sustainability. At the same time, this is also at risk if nothing is done to improve governance of water, as was seen in the 2018 drought.

Despite these silences, it is important to note that the shift in discourse seen in the water sector has widened the debate from only technical management of water to also include other factors such as economic and social. This is a step in the right direction towards better water governance.

5.2 Normative level

This section focuses on effects of the 2018 drought on water policy, such as legislation and action plans, with southern Sweden and the region of Skåne as a case. The interview data has been categorized according to the levels where policy change has happened, from regional to EU level.

The droughts in 2016 to 2018 have led to an increased focus on drought and water shortage in the regional plans for southern Sweden, which before mostly targeted water quality concerns. This can be seen in for example the production of a Partial Management Plan on Drought and Water Shortage (Delförvaltningsplan) in 2022 as a complement to the Water Authority's general six-year water management plan for 2022–2027.

In Skåne, the County Administrative Board (from here on called County Board) has been given an expanded mission to protect and monitor water resources, due to a national campaign after 2018 to protect Swedish water resources (Interview 3). This mission also includes to inform water users about alternatives to extraction from rivers and streams, such as irrigation dams and groundwater. The County Board also argues that they work “proactively and supportively towards municipalities to form more protection areas for drinking water” (Interview 3). They see the regional Water Supply Plan (Vattenförsörjningsplan) for Skåne as a way to contribute to a secured access to water in a long-term perspective, by mapping and analysing the current water supply in relation to future needs and climate change. The water supply plan also functions as a basis of planning for municipalities, who can contribute

with more detailed analyses at the local level by implementing the regional action proposals into their own local plans (Interview 3). The County Board created their current water supply plan already in 2012 and the interviewees wrote that the new and updated plan is due to be published in 2024, but did not elaborate on how it will differ from the current plan (Interview 3).

When I asked if they have experienced any changes in policy, one of the interviewees argued that the Swedish water sector “is a sector in change” (Interview 1), but since society is usually slow at embracing change, we need to adapt to the changes and while new legislation and routines come after. Planning for a secure drinking water supply in a changing climate, in the context of increased competition over water resources, is expressed as a complex issue that needs consideration on different levels (Interview 2). The question of who should get water first is one example, because it is both a question within the municipal supply, but also on the water resource level since water, according to EU regulations, should go to ecosystems first and after divided among users (Interview 2).

Water policies in Sweden are affected by EU directives to a high extent, and the Water Authorities (regional level) are responsible for implementing these directives (Interview 2). The directives, and therefore also the work of the Water Authorities, have previously mainly focused on water quality. The Water Authority interviewee perceives that the EU increasingly work with drought and water shortages, and that these issues have been lifted on the EU level after the severe European droughts in 2022 (Interview 2). This has caused the EU to push Sweden and a few other countries with risk of droughts to develop plans for water shortage. The Water Authority believes that they will see more demands from the EU, but also more guidance on how to work with droughts (Interview 2). One interviewee is critical to the EU directives and argue that they “are perceived as quite radical at times” and that “there is some debate as to whether it is applicable” to the Swedish water sector (Interview 1). They argued that the directives’ quality standards are easily exceeded when building water treatment plants or when cities are developed and can therefore hinder development. This critical view of the EU directives could be a potential risk in the willingness of the sector to implement future directives on drought.

5.3 Institutional level

This last section focuses on effects of the 2018 drought on how regional actors, mainly County Administrative Boards, and local actors, mainly municipalities, work with water security, with southern Sweden and the region of Skåne as a case.

The droughts in 2016, 2017 and 2018 have, according to all interviewees, led to more preventive work by local and regional actors in southern Sweden. There is more inter-municipal cooperation on water supply issues, especially in securing alternative water supply from other areas as a complement to the municipal water supply in drought periods. Municipalities within the whole South Baltic water district are also seeking new court order permits for water extraction (Interview 2).

The County Board in Skåne sees that municipalities in Skåne increasingly work to secure their water supply and that, similar to the EU level, water shortage issues have been lifted on the municipal agenda (Interview 3). Municipalities are also increasingly applying for permits for new water withdrawals. The Board has also granted municipalities drinking water support to finance campaigns to save water, leak detections, re-use of wastewater and to plan for new water protection areas (Interview 3). It is “the municipalities’ obligation to be able to supply water” (Interview 1), but since the 2018 drought, cooperation between municipalities is becoming increasingly important to ensure that this obligation is met. Even cooperation between regions in southern Sweden is seen as necessary by interviewee 3, who believes that Skåne cannot on its own supply enough water:

I actually think that it is almost impossible for Skåne. There is not enough water in Skåne to provide water for everyone (...) cooperation between different regions is needed to be able to supply enough water for everyone. (Interview 3)

Water supply providers in Skåne, such as Sydvatten, have contingency plans (beredskapsplaner). These, according to interviewee 1, are relatively new but have also existed in the past, for example in Malmö which had frequent water rationing before the Bolmen tunnel was built which secured a sufficient supply. These contingency plans start each summer and include planning of municipal water use and supply, but also communication to citizens and other users (Interview 1).

On a regional level, the County Boards in the district have increased their supervision of water extractions and water protection areas (Interview 2). The Board in Skåne consider themselves to have good knowledge of water use in the region:

Compared to other County Administrative Boards, I would say that Skåne has relatively good control over which water withdrawals are made. (...) Having said that, we absolutely do not know about all the water withdrawals that take place. (Interview 3)

The interviewees stated that the reason for this good control is mainly due to a large campaign in 2019 to find and monitor all water extractions from valuable waters (Interview 3). Valuable waters,

according to their website, are water environments judged to be nationally valuable since they have high values for fishing, nature conservation or culture and must be protected (Länsstyrelsen Skåne, n.d.-a).

One part of the County Boards supervisory mission is to ban water withdrawals when deemed necessary, which Skåne has had to do repeatedly during the last few years. They have both issued total bans and bans when the water levels fall below 30% of the rivers' mean water flow. The County Board has issued guidelines for water abstraction, but the interviewee stated that some users did not respect these guidelines and repeated warnings have led to total bans. In other cases, users were obliged to ask the court for permission, which is the authority who issues water permits and these permits overthrow the decision of the County Board (Interview 3). When asked if they help users find alternative water sources, the interviewees answered that it is not part of the mission of their unit since they function as a supervisory authority. However, in the summer of 2018 a taskforce was set up by the Royal Commissioner so that the County Board could help to connect farmers to waters that still could be extracted, and farmers could for a limited time use water from Ringsjön which is normally a water supply for Sydvatten. These examples were special to the 2018 summer and shows that water availability during the drought was not sufficient through the normal water management practices and available water bodies (Interview 3).

5.4 Future

This section presents changes needed in water governance related to water security and drought, as expressed by the interviewees and the reports. Three themes that emerged and are discussed below are 1. Changes in national and local governance, 2. How the water sector can work with measures for climate adaptation, and 3. Reducing the demand and use of water.

5.4.1 Proposed changes in national and local governance

The proposed changes in water governance by the interviewees are all related to improvement of collaboration and clearer responsibilities. It seems to be a consensus among the interviewees that the current system with many actors and levels is sufficient, but that responsibilities need to be clarified. The Water Authority interviewee believes that all actors share the same goals in handling drought and water shortage, and that there is a general consensus in national and regional reports for the need to simultaneously work with broader and more overarching efforts such as the division of responsibilities, and at the same time focus on the smaller scale, such as municipal management (Interview 2). One

national issue the interviewee mentioned is deficiencies in environmental monitoring and data flows, which “is a problem in Sweden that affects many levels, and it also affects the water governance work” (Interview 2). These types of issues need to be dealt with in a different way across levels than what the current governance model allows.

On a local governance level, municipalities can improve their work with water security by working more strategically together on water issues, both with other municipalities and with other local actors. Municipalities could also benefit from seeing water as one entity and manage water collectively, instead of working with water in different departments such as VA (water and sewer) and environmental supervision. Interviewee 2 highlights that this is not an easy task and that coordinating all water management is very difficult in practice.

Related to the need for clearer responsibility is the question of how water governance should be structured, and on which level. In other words, which actor or level should have the overarching responsibility for water security in a changing climate? This was a main point of discussion in the reviewed documents from HaV, IVA and Sydsvatten. Interviewee 1 argued that it is best answered by looking at responsibilities and what actors are already obliged to do. Municipalities are obliged to provide water to households but not to industry or agriculture and should in times of water shortage therefore prioritise accordingly. One should not automatically imagine that there needs to be another actor in control of water supply in drought periods, the interviewee argued, and the state can, and should, only interfere in cases of overextraction. This interviewee also indicated that there is too much focus on, or belief in, that the national level should have the main responsibility (Interview 1). Municipalities can take a great deal of measures to improve water security without interference from the national level, for example increasing the VA-fee, to invest in infrastructure and climate adaptation, and campaign for reduce water use (Interview 1). This however clearly contradicts the reports which propose a stronger national governance of water issues, for example by suggesting HaV to be in charge of a national water budget (see Q1 in Analysis) (Sydsvatten, 2019). Local responsibility can also be questioned from a hydrosocial cycle perspective when water is being transported from one basin to another area, as is the case with water from lake Bolmen to municipalities in Skåne (Interview 1), and is suggested even in other parts of Sweden such as in Uppsala (Uppsala Nya Tidning, 2019). With more flows of water between basins, municipalities and regions, the need for a better national governance of water becomes even more apparent.

5.4.2 Measures for climate adaptation

Another theme that emerged in the interviews is proposed changes in water governance necessary for climate adaptation. When discussing the impacts of the 2018 drought on Skåne, interviewee 1 stressed that the water shortage mainly was an effect of low capacity of treatment plants, due to poor water quality, rather than low water levels per se. For this reason, climate-induced changes on water bodies call for a review of the capacity of treatment plans and whether VA-organisations could benefit from working as collectives (Interview 1). Here, state involvement could be necessary to bring in a national understanding of the whole Swedish water supply system, according to interviewee 1.

Climate change can both pose threats to the water resources and create competitive situations for water users. “With an increased population and a changing climate, the need for water in the county may increase. The work to secure the water supply therefore needs to continue in the future” (Interview 3). The interviewees continued by listing infrastructure-related measures to improve and contribute to a sustainable and safe water supply, including maintaining water pipes to reduce leakage, making irrigation of crops more effective, constructing irrigation dams to have more surface water in water basins before a drought period, and strengthening the buffer capacity in the landscape (Interview 3). The interviewees also mentioned long-term water security measures such as planning for increased capacity and creating reserves with emergency water supply, connecting pipe networks between municipalities, and improving the protection of existing water sources so that they can be used long-term. These are all measures that have been added to the regional water agenda after the droughts in the last few years (Interview 3) but need continued implementation for climate adaptation.

5.4.3 Reducing water use

As discussed in the Discursive level, reducing water use is less prominent and often only briefly mentioned in the reports. The interviewees agreed that there is generally more talk about how to secure current and new water sources than on saving water, but the interviews provide a different picture by discussing measures to reduce water use equally to water efficiency measures. The County Board proposed campaigns to reduce household water use and changes in the price of water to reduce unnecessary consumption (Interview 3). One interviewee from the County Board compared Sweden’s number of 140 litre/day to Flanders’ (Belgium) 90 litre/day and stated that Skåne has less rainfall per year per surface unit than Flanders but still uses more. Belgium has also come further in water saving techniques, as it is mandatory for households to install rainwater reservoirs in new houses (Interview 3).

Sweden's water consumption was also raised by interviewee 1, who compared Sweden to Denmark's 100 litre/day. The reason for this difference, despite the countries having similar socio-economic status, is a question yet to be answered. When asked to elaborate on potential answers, the interviewee said that while both countries take pride in their water quality, they might think differently regarding the abundance of water in each country (Interview 1).

The question of whether people should be allowed to use as much water as they want has been discussed in municipalities in southern Sweden during droughts, for example in Laholm and Båstad, and it seems to be a new issue without proper legislation for guiding municipalities in how to control household consumption (Interview 1). The same interviewee also mentioned that calls to lower water use have been effective within municipalities, but only in the short term.

The Water Authority interviewee added another dimension to the issue of water use restrictions, by pointing to the need to acknowledge the biggest water user in Sweden: the industry. It is important that households reduce their water consumption, but more actions need to be addressed towards water heavy industries (Interview 2). For municipalities, the Water Authority has referred to the municipal energy efficiency plans and believes that the same type of efficiency planning can be made for water. Thinking 50 years ahead and planning for how to reduce water use is particularly important to ensure that everyone receives water at the same time in a changing climate, according to the interviewee (Interview 2).

6 Reflections

Since the main findings from the WPR approach and interviews (see Table 5), have been analysed and discussed above, this section reflects on future research possibilities in relation to this study, and discusses the scope and limitations of this thesis and chosen method.

6.1 Future research

This thesis has contributed to the field of Swedish water research and sustainability science by exploring a new and emerging water issue in a Swedish context. This is a starting point for further research on a range of water governance and management issues. To give example of a few questions; How will drinking water be affected if water shortages increase the competition between sectors?; How can pricing of water be inclusive and at the same time ensure that water is valued properly?; How can water users be incentivised to use water more effectively?

Building on the proposed future changes and needs presented above, I wish to reflect on one particular question, who should have the overarching responsibility for water security in a changing climate? The answers given by interviewees and the reports differ widely and this finding is on its own not sufficient to conclude that there is a disparity between the local and national levels. However, this question would be interesting to pursue in further research by analysing views on responsibility across the water sector levels. Linking this to Political Ecology research, municipal responsibility over drinking water provision such as the Swedish model is pursued in countries like Spain, where remunicipalization is pushed by civil society organisations as a way to de-privatize water (Grau-Satorras et al., 2019; March & Sauri, 2017). According to Bell (2020), communal water provision can be a good governance structure, especially in comparison to where water is privatised, but no model is immune to diverging interests which means that all forms of governance can lead to unequal distribution and exploitation of nature. For Sweden, municipalities already have the responsibility over water supply, and this is not likely or even necessary to change. However, increasing the collaboration between the local level and the regional or national, who can have a better overview of the water supply in the whole region or country, could increase resilience and preparedness for coming droughts (Boholm & Prutzer, 2017; Haigh et al., 2023; Muth et al., 2017; Rhee et al., 2015).

6.2 Scope, limitations, and method discussion

This thesis is deliberately wide in scope, as the topic has little coverage in research and since water is a highly complex topic and field. As mentioned in the introduction, the main focus lies on drought and water shortage, and I have also chosen to focus on the connection between water and society (particularly drinking water), rather than on water and the environment. This topic delimitation leaves out flooding, which is also a major threat to water security in Sweden both in current and future climate (Miljödepartementet, 2022), but it has larger cover in research and policy than drought and is therefore not included here. It is however important to note that Sweden is facing both types of extreme events, and both need to be prioritised in Swedish water governance.

The wide scope and complexity of the thesis topic comes with limitations, mainly in the depth of analysis of the research. At the same time, it is a starting point that allow for future research to be developed. Another limitation is that the data collection was made in Swedish and then translated to English. I reserve myself for potential errors in translation and have written out the Swedish terms in parenthesis when the concept does not have a direct translation in English.

This thesis does not aim to be generalizable as every country's water supply and governance differ depending on climate, water availability and many other factors. However, water is likely taken for granted and undervalued in other water abundant countries and this study can therefore provide an example of how this discourse is changing in Sweden. The study could be replicated by asking the same questions in the text analysis and interviews, but there is also room for many new topics to be studied from my results in Sweden or elsewhere.

A reflection on the theories and the WPR approach is also needed here. WPR and Political Ecology are both critical in examining power, silences, and understandings of a problem. Through WPR, Bacchi aimed at investigating knowledge and power relationships (Bacchi, 2009). For this reason, they have not been in conflict when studying this topic but rather enhanced my critical lens. We are seen as governed through how scientific theories construct us, and because of that "our research is in itself a process of governing and constituting subjects" (Bacchi, 2009, p.235). Research is powerful knowledge, and it produces specific kinds of political subjects. In other words, how we do research, and who have access to do research, impact problematisations and produces "knowledges" (Bacchi & Goodwin, 2016). This thesis is an attempt to contribute to the less researched side of water issues in Sweden, by questioning commonly described problematisations and producing knowledge that may change or widen them.

In my theory section, I elaborated on choosing the WPR approach rather than another discourse analysis with a linguistic focus. After reflecting on this approach, I believe that this has offered a more flexible and less pre-structured analysis and allowed me to analyse the content of texts instead the way it was written. Most importantly, it gave me insights in underlying assumptions and unproblematised elements, which helped me understand and criticise the Swedish water discourse. I have used the approach as a guidance for analysis of selected reports and to answer the first research question, rather than making a full WPR analysis. There are likely plenty of other insights and conclusions that could be drawn using the approach fully. However, this would have only allowed for an analysis on discourse and its effects, but not given insights into my second research question on how the change in discourse has translated into policy and action. Another limitation with the approach, especially in relation to the topic of this thesis, is that the analysis becomes rather generalised when following Bacchi's questions and guidelines. This has contributed to the wide scope of the thesis.

7 Conclusion

The aim of this thesis was to understand how the Swedish water sector responded to the unprecedented drought in Sweden in 2018, and to analyse implications of the drought on how actors in southern Sweden view and work with drought and water shortages in relation to climate change.

The 2018 drought has led to a change in discourse in the water sector, particularly in how drought and water availability have become part of discussions regarding water management in the Swedish water sector. The WPR analysis showed that the current governance of water lacks the planning needed for it to ensure water security in a changing climate, and the problem was represented to be poor planning and division of responsibility in the water sector, illuminated by the 2018 drought. This has caused a shift from a focus on water quality and technical management of water, to new discussions on water security related to safe supply, drought management and better planning. Climate change is increasingly seen as a threat to a safe water supply in Sweden, which calls for further research and planning on the impacts of droughts and other types of extreme weather on Swedish water supply. The 2018 drought has also led to changes in water policy and how actors work with water, at least in southern Sweden which was the focus area for this thesis. Drought and water shortage have increased focus in policy from regional management plans up to EU directives. Similarly, the work with protection and monitoring of available water resources has expanded. The results also show that actors, especially on the local level, work with drought in a different way than before, including more preventative work and more inter-municipal cooperation on securing alternative water supply.

The ambition with the thesis was also to discuss what is needed for a more sustainable water governance in Sweden. The results show a fragmented path forward with a broad variety of measures, which I narrowed down into three major areas: changes in national and local governance, measures for climate adaptation and reducing water use. Highlighted measures are increased collaboration between actors and clarified responsibilities, especially in planning for a safe water supply, accounting for an increased need and competition of water, and reduction of water use to be more resilient in times of drought. How water is governed is reflected by how we view and value water, but also how we research water. This thesis aspires to be a starting point for more water security research in Sweden. Water has long been taken for granted, but we are now facing a changing climate and find ourselves in a new era for water governance.

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Appendices

Appendix 1: Table of supporting documents to the WPR analysis

Reports used for text analysis. Report names translated from Swedish by this author.

Author	Year	Report Name	Scope
Swedish National Board of Housing, Building and Planning (Boverket)	2018	Physical planning for a safe drinking water supply - needs and possibilities (Boverket, 2018)	National level <i>Focus on drinking water supply</i>
National expert council for climate adaptation	2022	First report from the National Expert Council for Climate Adaptation (Nationella Expertrådet för Klimatanpassning, 2022)	National level <i>Climate adaptation</i>
Ministry of Environment	2022	Sweden's Adaptation Communication A report to the United Nations Framework Convention on Climate Change (Miljödepartementet, 2022)	National level <i>Climate adaptation</i>
RISE	2019	When the water supply fails (Sjöstrand et al., 2019)	Industry/business <i>Water use/saving</i>
Swedish Agency for Marine and Water Management (HaV)	2018	Distribution of water in the wake of the drought (Havs och Vattenmyndigheten, 2018)	National level <i>Use of water laws in times of drought</i>
Livsmedelsverket	2017	The TORKA mission 2017 - How will Sweden face the next drought? (Livsmedelsverket, 2017)	National level <i>Drinking water & drought</i>

Appendix 2: Interview guides

Translated to English.

Interview 1

1. The latest reports on water management in Sweden show a concern for and understanding of climate-related effects on Swedish water supply. How long, and by whom, has climate change been considered a threat to water security in Sweden?
2. Have there been any changes in legislation or policy since the 2018 drought linked to climate change and drought?
3. The reports from HaV, IVA and Sydsvatten speak for an improved and integrated management of the water sector. What is required and what must be done, by whom, for these proposals and strategies to be implemented?
4. The reports seem to suggest a national governance of water issues. For example, Sydsvatten proposes a national water budget. At the same time, there is also an argument for managing the water at a catchment level. If we are talking specifically about drought and future water security, how and who should decide on water?

5. Can you see any changes in how you work with water management in the municipalities after 2018, to prevent water shortages?
 - a. If yes, what is done and by which actors?
 - b. If no, what would be needed to create sustainable management at regional and local level (in Skåne)?
 - c. What is the role of VA organisations?
6. How necessary is it to change the current management of water to ensure water security now and in the future? What consequences would today's administration have?

Interview 2 - Water Authority

1. Can you briefly explain the Water Authority's activities linked to drought and water shortages and how you work in relation to HaV and the County Administrative Boards?
2. The drought in 2018 is seen by several water stakeholders, such as the Skåne County Board, as a wake-up call. Can you tell us more about how the drought has affected your work and view of southern Sweden's water supply?
3. Have there been any changes in your assignments and how you work with EU directives since the drought of 2018?
4. Can you tell me more about the decision to make a sub-management plan against drought and water shortages?
 - a. Has there been a need to focus on drought in the past?
 - b. What is the status of the measures presented?
 - c. Do you, together with the district's County Boards, have the conditions to implement the measures that are proposed - especially increased knowledge about water extraction?
5. Can you see any changes in how the municipalities in your district work with water management after 2018, to prevent water shortages?
 - a. If yes, what is done and by which actors?
 - b. If no, what would be needed to create a sustainable administration at a regional level in Skåne?
6. HaV, IVA and Sydsvatten have advocated for a need to improve and organise the management of the water sector. From your perspective, do you see any problems with the current division of water management? What are the most important areas to focus on?
7. Climate forecasts point to greater variations in weather and more drought in southern Sweden. Is it necessary to reduce current water withdrawal/use to ensure water security in the future? What consequences would today's management have for drinking water and water environments in southern Sweden?

Interview 3 – County Administrative Board

1. Can you tell me about how the County Administrative Board functions as a supervisory authority over water operations in the county, and what that means?
2. You write in your brochure about Wetlands and Irrigation that the 2018 drought was a wake-up call. Can you tell us more about how the drought has affected your work and view of Skåne's water supply?
3. Have there been any changes in your mission since the drought of 2018?
 - a. How much potential is there within the county to increase the number of water sources and increase the protection of existing ones?
 - b. Is there a good understanding of all water withdrawals that are made in the county?
4. Has the County Administrative Board had to decide to ban water abstraction?
5. How do you view the mission of developing a water supply plan?

- a. Has there been a need to develop these plans in the past?
 - b. What is the current status of the assignment?
 - c. Do you have the capacity to develop and implement the water supply plan?
6. Can you see any changes in how the municipalities work with water management after 2018, to prevent water shortages?
 - a. How big of a role should water conservation/water efficiency have in the municipalities' work?
7. HaV, IVA and Sydsvatten have advocated for a need to improve and integrate the management of the water sector. From your perspective, do you see any problems with the current division of water management? What are the most important areas to focus on?
8. Climate forecasts point to greater variations in weather and more drought in southern Sweden. Is it necessary to reduce current water withdrawal/use to ensure water security in the future? What consequences would today's management have for drinking water and water environments in southern Sweden?
9. Skåne already receives water from Bolmen due to previous water shortages, what is your view on future water supply in the region, taking into account more drought and increased population?